"TRENDS" system guides telephone expansion at **The Chesapeake and Potomac Telephone Company**

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Products

BUILDING FOR BETTER SERVICE TO THE NATION . . .

New Southwest Dial Station, one of a number of construction projects which continually improve the "ability to serve" of The Chesapeake and Potomac Telephone Company.

● Responding to urgent Federal Government needs and rapid economic growth in Washington, D. C., The Chesapeake and Potomac Telephone Company has embarked on a $43 million construction program. This is the largest such program in the company's history. In addition to expanding C & P facilities for serving the Nation's Capital, it is creating new jobs and adding health and vigor to the District's economy.

An investment of approximately $11 million is being made in land and buildings, $8 million in central office equipment, and $5 million for cables, microwave facilities and other outside plant equipment.

New telephone units for use on customers' premises, such as telephone sets, teletypewriter machines and private branch exchanges, are being added at a cost of $19 million.

In total, an average of more than $800,000 is being spent each week for the additional land, buildings and telephone facilities required to serve Washington's communications needs.

Service improvement and growth go hand-in-hand. With the introduction of Touch-Tone calling in 1965, Washington became the first major city in the Bell System to make this newest service, pictured on the front cover, available to all business and residence customers.

Nevertheless, as a result of efficient management real cost of telephone service, measured as a percentage of the average person's income, has become less and less over the years. The rates Washington customers pay for local service are the lowest of any city in the United States with a comparable local calling area. In addition, since 1959 there have been three major reductions in long distance telephone rates.

"Service second to none," is the achievement of The Chesapeake and Potomac Telephone Company in serving the Nation's Capital, Washington, D. C.

The Busy Hour Concept In Facilities Planning

Planning current utilization and future expansion of the telephone facilities serving the Nation's Capital constitutes a vital and complex problem. "We must have accurate data on which to base our future requirements," explains C. M. Calvert, Traffic Engineer.

C. M. Calvert, Traffic Engineer who developed and coordinated the TRENDS system.

Telephone engineers must provide lines and equipment in sufficient quantities to insure that subscribers will have a good grade of service during the hour or hours in which the office is operating at peak load. Studies, based on the calling characteristics of the subscribers, are made to determine the "Busy Hour" for each individual Central Office.

Peak loads are generated when a demand for service is placed on dial equipment greater than the normal average load. During the "Busy Hour" this demand in The C & P Telephone Company can be generated from an important governmental decision in one case to something as routine as the opening of school in the fall.

Load Measurement Unit

The student call load illustrates the two dimensions of the load index measurement which has been developed as a means of comparing traffic load. This unit of measurement is hundred call seconds, abbreviated as "CCS." It is a product of call-rate-per-hour times "holding time." The CCS/MS (Main Station) in the case of a home with several teen-age students would be the number of calls made during a "busy hour" times the length of each call. As any parent knows, this is likely to approach maximum during certain evening hours.

In planning a new facility such as the new Southwest Dial Station pictured on page 2, the engineering problem may be defined as providing sufficient lines and related equipment to provide for anticipated CCS load during busy hours.

Load Measurement Methods

Obviously the telephone company cannot and does not record the number and duration of each of the millions of calls placed by its customers. Load measurement is achieved by a sampling technique which notes the impulse created by the initiation of calls on selected lines during a busy hour and approximates average duration by scanning the line at intervals to determine whether it is in use. Both procedures are implemented by a "sleeve" on the line which does not permit "eavesdropping" but simply determines electrically whether or not the line is in use. The sleeve has absolutely no effect on transmission quality.

By comparing the total CCS of a group of subscribers with a norm, it is feasible to obtain a load index which characterizes the service requirements of that group, and which will aid in planning facilities to meet these requirements. Gathering data of this type is the purpose of telephone traffic studies.

Studies Aid at Three Vital Points

Effective administration of current facilities and sound planning for the future are aided at three points by traffic studies.

1. Day-by-day administration at the local office level is made easier by the provision of daily and weekly load patterns developed from past experience.

2. Maximum service is obtained from existing facilities by equalizing busy hour loads among local stations. In order to do this effectively, the load characteristics of various groups of subscribers must be accurately known.

3. Better planning of new facilities is facilitated by ac-

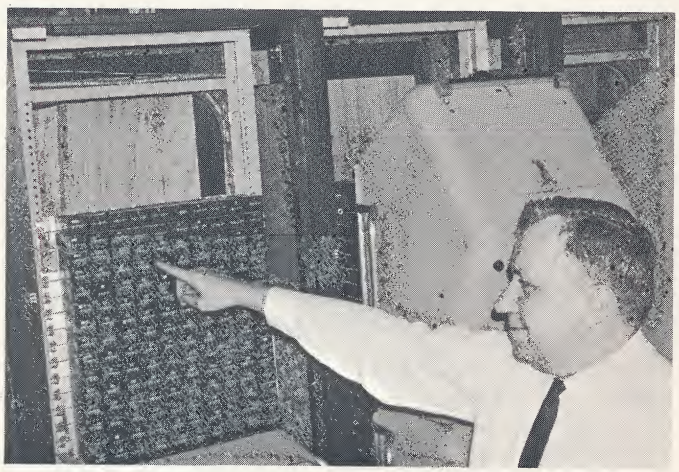
curate knowledge of future needs, stated in specific terms.

Gathering Data

Telephone traffic studies began 35 to 40 years ago and initially consisted of having operators press a "peg" button each time a call was put through, thus activating a counter. Traffic load was determined by reading the counter hourly, subtracting the prior reading from the last reading and entering the difference.

The next advance was to achieve the counters by means of the "sleeve" connection cited above and to group the counters in racks. A maintenance man read a battery of counters each hour and entered the data on a special form.

Finally, special cameras were designed to photograph the racks of "registers" or counters. This step eliminated "on the spot" transcription, saved time and promoted accuracy.



Lewis M. Seaton, Staff Assistant in the Traffic Department, points to a Traffic Register. Behind Mr. Seaton is one of the cameras used to record register readings at predetermined intervals.

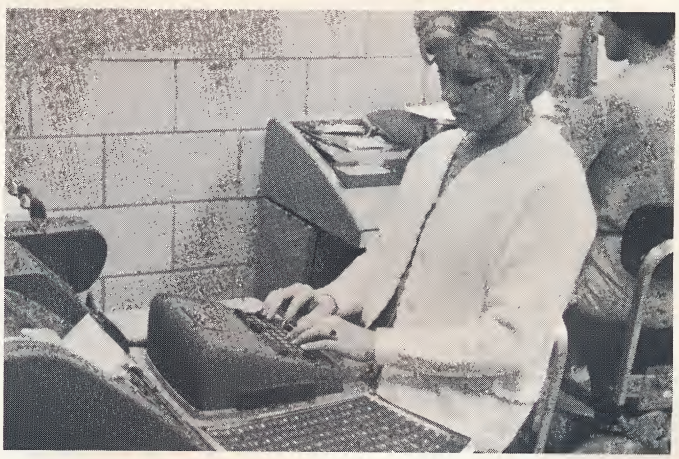
Getting Traffic Data Onto Tape

The mounting need for traffic studies and the enormous number of counter readings involved made it obvious to Chesapeake and Potomac Telephone Company executives that only data processing equipment would provide the traffic "answers" needed at a feasible expenditure of time and money.

At first key punch operators could prepare the necessary tab cards while viewing the film of the traffic registers, however, with the continuing growth of telephone service and the establishment of new dial centers, the increased volumes of data required that new techniques be employed to insure prompt processing of data. An effort was made to acquire microfilm reading equipment to meet the new requirements, but to no avail.

Further tests revealed that the key punch operators could work with increased speed and accuracy from enlarged prints made from the register film. After evaluating several enlarging systems, the Itek 18•24 Reader-Printer was found to be most satisfactory and two Itek units were installed in the "Basic Data" section. Prints produced in this section are provided to the service bureau which performs data processing operations for The Chesapeake and Potomac Telephone Company.

Mrs. Catherine Lloyd, Clerk in Basic Data, views enlarged projection of TUR film, using the Itek 18•24 Reader-Printer. Finished prints are stacked at her right.



Miss Nancy Sugrue, Key Punch Operator, creates tab cards for TRENDS program.

The Itek 18•24 Reader-Printer produces two enlargements per minute from other regular microfilm or 35mm film such as that exposed in the recording cameras. The operator may examine each image on an 18" x 24" screen and then may produce a print identical to the viewed image simply by pressing an exposure button.

Data Processing Functions

As indicated in the following flow chart, the data processing operation sorts the readings into the required categories, performs the required calculations and produces print-outs in the form required by Dial Administrators, Traffic Engineers and others requiring traffic data.

Step-by-Step Procedures

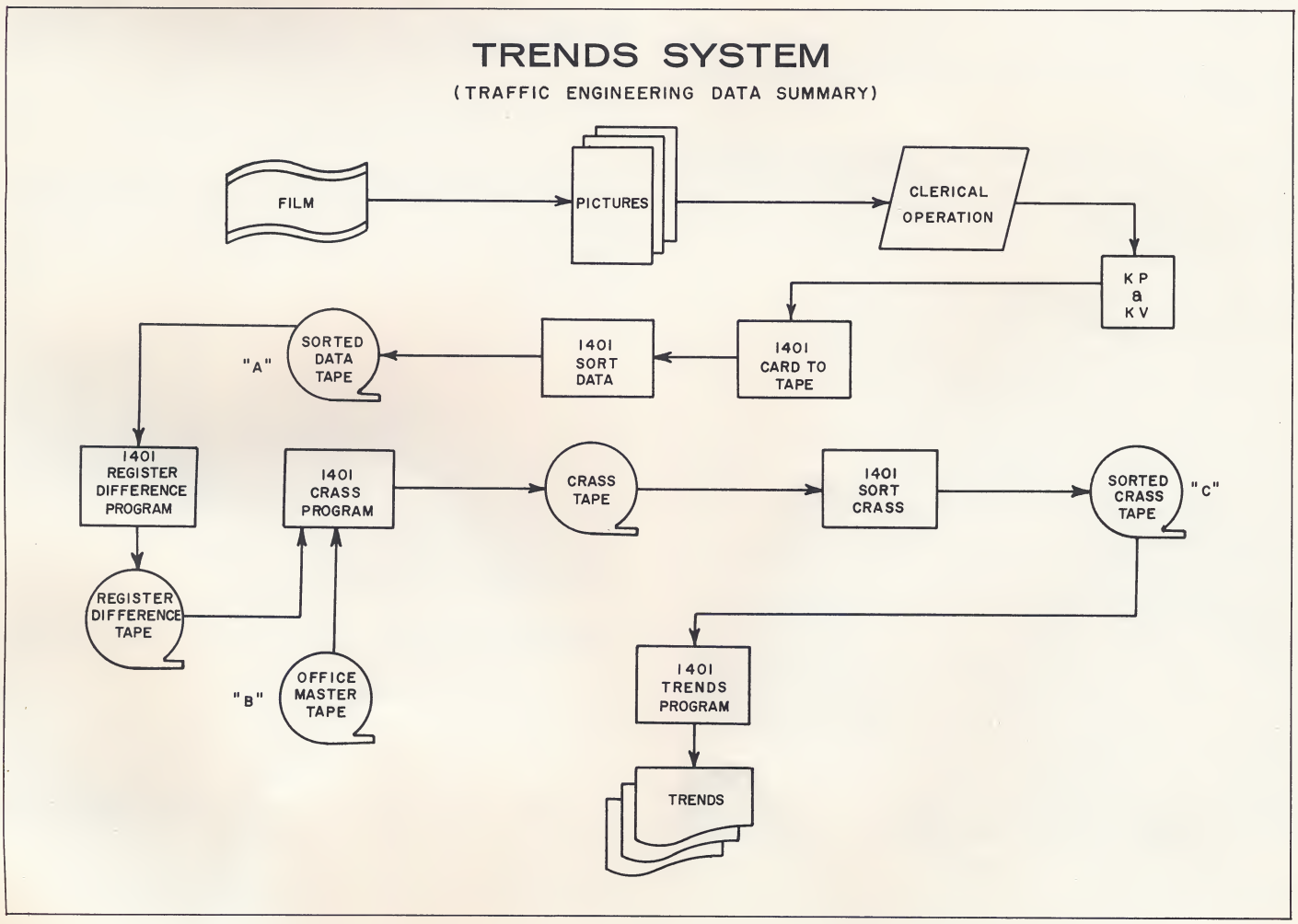
The following procedures are employed for producing weekly Traffic Engineering Data Summaries (TRENDS for short):

1. The control clerk completes a "print distribution schedule" for the coming week, showing which cameras are to be photographing during what hours and where the resulting prints are to be sent.

2. During the weekend a maintenance employee removes last week's film from the traffic register cameras for processing, inserts new film in the cameras and sets a clock to activate the cameras at the hours required for compliance with the print distribution schedule.

3. Film is processed and sent to Basic Data.

Charles Miller, Staff Assistant, assigns Traffic Registers for the acquisition of data.



The Chesapeake and Potomac Telephone Co

PRINT DISTRIBUTION SCHEDULE

Office CENTRAL AVE.

	Camera No. 3		Camera No. 4			Camera No.		Camera No.		Camera No.		Camera No.	
	Eng	D.A	Eng	D.A	TRK	Eng	D.A	Eng	D.A	Eng	D.A	Eng	D.A
A.M.													
1:00													
2:00													
3:00													
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12:00													

Portion of Print Distribution Schedule used to program TUR cameras and allocate Itek Reader-Printer enlargements produced from the TUR film.

4. Film is checked by Basic Data to assure that it conforms with the requirements of the print distribution schedule.

5. Prints are produced on the Itek Reader-Printers to fulfill schedule requirements. Some of these prints are routed to Dial Administration, some to the Trunk Engineering Group, and others to Traffic Engineering.

6. The control clerk in the Traffic Engineering Department checks the prints against the schedule and records the date received. Prints are carefully examined to see that they conform to requirements for key punching. Any required revisions are entered in colored pencil.

Mrs. Carol Scott producing TRENDS prints on the Itek Reader-Printer.

7. With a covering transmittal form attached, the prints are taken to the Service Bureau.

8. A header card is produced identifying each group of prints and then each row of registers are punched into a card.

Mrs. Charlotte Wood, Clerk in the Traffic Engineering Department, checks prints to make sure that all data are correct and clear before transmittal to Data Processor.

9. The unsorted cards are read into a tape, and then processed to produce a sorted tape.

10. The subtracting operation is performed, and a tape produced showing register differences.

Miss Linda G. Ray, Staff Assistant, C. O. E. Analysis, reviews the TRENDS Summary.

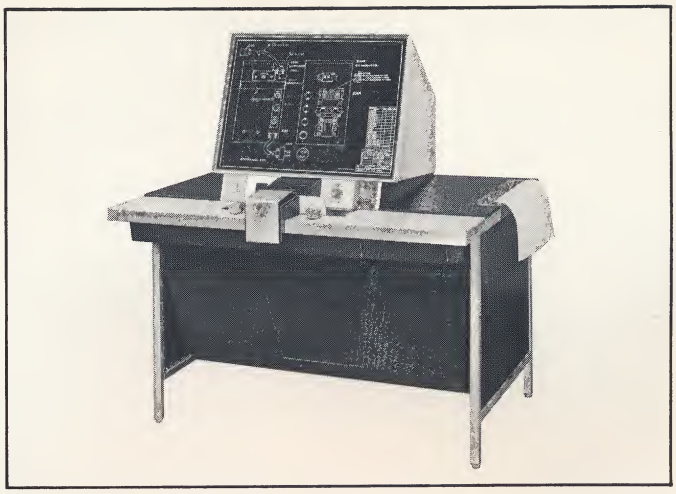
11. The register difference tape is then run against the office master record tape and common register numbers are assigned to selected items. This is referred to as the CRASS tape (Common Register Assignment tape).

12. The CRASS tape is then sorted by the common

Summary

Sound facility utilization and planning is essential for a telephone operating company, such as The Chesapeake and Potomac Telephone Company, Washington, D. C. This planning is based on continuous studies of busy-hour line usage.

The Chesapeake and Potomac's TRENDS systems provides the required traffic data in readily usable form. Costs of collecting and reporting data are minimized by combining modern automatic equipment for counting, photographing, printing and processing the information. An Itek 18•24 Reader-Printer was selected as best meeting the requirements of the system.



Itek 18•24 Reader-Printer of this type employed in the TRENDS program.

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